CANADIAN ARCHITECT AND BUILDER

FINE AND INDUSTRIAL ARTS · DECORATION · FURNISHING
CONSTRUCTION · SANITATION · ENGINEERING

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—THE—
Canadian Architect and Builder,
A JOURNAL OF MODERN CONSTRUCTIVE METHODS,

PUBLISHED ON THE 15TH OF EACH MONTH IN THE INTEREST OF
ARCHITECTS, CIVIL AND SANITARY ENGINEERS, PLUMBERS, DECORATORS, BUILDERS, CONTRACTORS, AND MANUFACTURERS OF AND DEALERS IN BUILDING MATERIALS AND APPLIANCES.

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EDITOR'S ANNOUNCEMENTS.

Contributions of technical value to the persons in whose interests this journal is published, are cordially invited. Subscribers are also requested to forward newspaper clippings or written items of interest from their respective localities.

The Ontario Association of Architects has appointed the "Canadian Architect and Builder" its official paper.

FOR the construction of a business building of medium cost, a Toronto architect received the other day tenders from fifty contractors. This serves to show the extent to which competition exists in the building trade, and in a measure accounts for the unremunerative condition of the business.

WHILE many Toronto contractors find a difficulty in getting enough work to do, a few seem to have secured more city contracts than they can get through with, in the time specified. The frequent complaints of citizens concerning delays in the execution of public works, has led the Mayor to make a personal investigation.

STONE is coming largely into use in Toronto of late, and the demand is certain to increase very rapidly. Many valuable stone quarries which have hitherto lain idle and unprofitable on the owners' hands, should in the near future prove sources of much profit. The quarries of the lower provinces are beginning to find a Canadian market for stone which formerly was sold almost exclusively in the United States.

EFFORTS are being made in Winnipeg to induce the Dominion Government to remove all obstructions from the channel of the Red River, and deepen the same so as to permit of Winnipeg being made the headquarters for Lake Winnipeg navigation. It is estimated that the modest sum of $13,000 would cover the cost of the improvement. If this be so, we should suppose that if the Government will not carry out the work, the city might very well afford to do so, in view of the commercial benefits which would be likely to accrue therefrom.

THERE are indications pointing to the city of Toronto as the scene of extensive building operations next year. One of these is the appointment of a committee of prominent citizens, to report a well-considered scheme for the erection of a commodious fire-proof hotel. It is designed that the proposed hotel shall be first-class in all its appointments. Its cost is placed at upwards of half a million dollars. There seems to be little doubt that a company with a capital of $1,000,000 will be formed to carry out the project.

WE think it would tend to the development of the Canadian Society of Civil Engineers and widen the interest in its work, if local sections or associations were formed in the principal cities throughout the Dominion. At present all meetings of the association are held at headquarters in Montreal, and are consequently inaccessible to a large majority of the members throughout the country. We learn that the American Society of Civil Engineers is about to take such a step, and the proposed new departure is meeting with much favor.

MR. Erastus Wiman, writing on "The Mercantile Agency and its Relation to Business," says the agencies have grown with the requirements and extension of trade, the result having been to create and crystallize a mass of information as essential to the safe conduct of business as the insurance company, the railway and other trade facilities. This is exactly what we might expect to hear from the head of a mercantile agency. Notwithstanding, we have reasons for believing that the information supplied through these agencies is not always of the character which business men can depend upon, and that in some cases at least, ordinary diligence is not observed to make it so.

THE Montreal Road Committee is out of funds, and what is worse, has exceeded the appropriation placed at its disposal by no less a sum than $43,000. Notwithstanding the large amount expended, the citizens are clamoring for improvements and repairs. The City Surveyor charges his deputy with the blame of extravagant expenditure. The Road Committee of next year will be expected to get along without the $43,000 over-expended by their predecessors, and that their pathway will not be strewn with flowers may easily be gathered from the *Gazette's* remark, that "if next year's streets are $43,000 worse than this year's, the aldermen are likely to hear from interested citizens." In other words the Road Committee of next year must be prepared to make bricks without straw.

AN unintelligent or careless workman may involve his employer in heavy loss, and is pretty certain in one way or another to prove himself a source of annoyance as well. An instance of this was brought to our notice recently by a perusal of the proceedings of one of the Toronto courts. Action was brought against a firm of master plumbers to recover $200 damages for injury to children and property by an explosion caused through the carelessness of one of their employees while repairing water pipes. The jury awarded the plaintiff damages to the

amount of $55.50. To this sum must be added the loss of a customer and the injury to the employer's business which a customer so treated and the publication by the daily press of the names of the defendants to the suit, are likely to entail. It pays to employ only competent, careful workmen.

IT is estimated that one-tenth of the gas supplied for illuminating purposes in the city of New York escapes through imperfect joints in the gas mains. This waste product finds its way into sewers, cellars, electric conduits, etc., leading to explosions and imperilling life and property. The city authorities have determined to pass an ordinance regulating the manner in which gas mains shall be laid and joints made. As the result of enquiries we find that little or no trouble is experienced in Toronto from this cause, the gas mains being well and carefully laid, and the company prompt to remedy leaks when notified that they exist. There seems to be room for improvement in one direction, however. The City Engineer should be furnished plans locating all the gas mains and services. At the present time the city's engineers have no idea in what part of the streets gas mains are laid.

DURING the winter of 1888, the architectural students of Toronto formed themselves into an association for mutual improvement in the study of their profession. Meetings were held weekly in the Canadian Institute building. In response to the invitation of the association, a number of valuable papers were read, addresses by architects and master builders given, and discussions held thereon. These all contributed materially to the advancement of the students who were so fortunate as to be in attendance at the meeting. Probably not more than one-quarter of the students of the city, however, were ever present. The majority of these, more especially the juniors, seemed to prefer to spend their evenings at some place of amusement. This had a discouraging effect on the leaders in the association, and as a result, no meetings were held last winter. We have many times heard the wish expressed, on the part of the students, that the association would, with the return of the winter season, reorganize and resume its work. We direct attention to the subject at this time in the hope that the students most interested will at once take action with that object.

IN reply to our request for information concerning the cause of the recent water famine at London, Ont., and what steps are to be taken to increase the supply, Mr. T. H. Tracy, City Engineer, writes as follows: "The consumption has increased so much (we now having 5,000 services connected) that in the hot dry weather, it exceeds the supply by almost 100,000 gallons per day, the supply being at present a trifle over 2,000,000 gallons per day of 24 hours. In the immediate neighborhood are additional springs of a capacity of almost 1,500,000 gallons per day, which the City Council have recommended the water commissioners to expropriate so as to increase the supply to 500,000 per day, which will be ample for many years to come. There are no difficulties in the way, and it is only a question of the expenditure of say $25,000 to bring in the additional water. The water commissioners have directed their engineer and superintendent (myself), to make a report on the capacity of these springs, and any other information he may deem necessary. I have no doubt the additional water will be secured before it will again be required. In the meantime, by the assistance of the G. T. R., who pumped a portion of their supply from the river, we have the reservoir again full to the normal level, and do not anticipate any more shortage this season."

A CAREFUL estimate of the freight and passenger elevators in operation in the city of Toronto, places the number of them at about 400. By far the largest proportion are freight elevators in use in warehouses, factories, stores, etc. A number of large office buildings are now in course of erection all of which will be equipped with elevators. This will make it necessary in order to secure and retain tenants, to place elevators in many business buildings which at present are without them. Thus it is likely that the number of elevators in Toronto will in the course of a few years be largely increased. In view of this, the question arises: is it not advisable that there should be instituted a system of elevator inspection, such as has been found necessary in New York and other American cities. Fortunately the number of accidents in connection with elevators, have been comparatively few in Toronto thus far. A number have occurred, however, and several lives have been lost in consequence. In addition to the necessity there is to see that elevators are properly guarded, it is well known that the strands of wire ropes subject to the constant tension imposed by elevator service, become in time disintegrated Accordingly these ropes require to be examined, and at intervals renewed, in default of which accidents with attendant loss of life, are almost certain to occur.

A SERIES of mass meetings of carpenters has been arranged to be held in Toronto, at which addresses are to be delivered showing the advantages of organization, and urging that steps be taken to secure perfect union among the carpenters of the city. At the first of these meetings, a speaker stated that by means of its perfect organization the Builders Laborers' Union of Toronto had secured for its members double the rate of wages formerly paid to them. In fact some of them were receiving higher wages than skilled carpenters. Canadian master builders should find here a lesson for themselves. Sooner or later they will come to realize that there is power in organization, and also that until they meet organization by organization, they will continue to be placed at a disadvantage in their attempts to withstand the ofttimes unreasonable demands of the labor unions. The fact that the wages of the builders' laborers has doubled in a short period of time, may be understood to mean that undue advantage has been taken of the contractors. It would be difficult to prove that the builders laborers were formerly paid only half what they were worth, or that the contractor's profits have increased to such an extent as to justify him in complying with the demands of his workmen. On the contrary, the ever increasing keenness of competition has greatly reduced the margin of profit to the contractor, and lessened his ability to pay higher wages. By means of a powerful organization the workmen have succeeded in extorting a rate of wages which in many cases eats up what little profit remains to the master builder from his contract, keeps his family in poverty and drives him to bankruptcy. These are facts with which many of our readers are familiar. The fault as well as the remedy rests with the master builders themselves. Unlike employers of labor in almost every other branch of industry, they have no organization for mutual protection. As a consequence they fall an easy prey to the avariciousness of powerful labor organizations, the members of which so frequently call upon them to "stand and deliver."

THE WOODSTOCK COMPETITION.

"CANADIAN architects were invited to compete for the honor of furnishing the plans for a court house at Woodstock, Ont. The appropriation provided for a $60,000 structure. Yet notwithstanding this, the plans selected were subsequently found to involve an expenditure of at least $100,000. It would seem from this that architects are sometimes decidedly ignorant of even the approximate cost of constructing a building after their own working plans."—*Building Trades Journal.*

Our St. Louis contemporary evidently writes without an understanding of all the circumstances connected with the Woodstock competition. When the competition was first announced we pointed out that a building containing the required amount of space and accomodation must cost at the very least about $100,000. This fact was known to every competing architect. It was a foregone conclusion on the part of the architects that a building fulfilling the requirements could not be erected at a cost even approximating to $60,000. The error in judgment which our contemporary attributes to the architects in this case clearly belongs to the Building Committee who asked the architects to perform an impossibility. Our contemporary is, however, correct in saying that in these days of wild estimating on the part of contractors, an architect's ideas of cost are sometimes far removed from the facts as they develop. It is a matter of

surprise to an architect to get a bid ten, twenty and sometimes thirty per cent. below the highest offered, which may have been about the figure at which he thought the work could be completed. The architect is again as much disturbed in his reasoning when bids are put in far in excess of his original estimate of the cost of the work. As there seems to be more or less guess work used in the process of figuring by contractors, the architect's only recourse is to make the best guess he can and trust to luck to have it approximated by the lowest and best bidder.

THE RELATION OF AN ARCHITECT TOWARDS HIS CLIENT.

By G. F. Stalker.

An architect's duties, and the position he occupies are, as compared with the duties and position of other professional men, somewhat ill-understood. Everybody knows that a doctor has to give his whole attention to his patient, and that a lawyer has to attend solely to the interests of his client. Any divergence from these well-understood lines of practice would bring discredit upon either doctor or lawyer. If any friction should occur in the prosecution of their professional duties, it is usually because the patient will not carry out the instructions of his doctor, or because the client assumes a greater knowledge of the law than his legal adviser. But in either of these cases there is no third party to interpose any objection to this or that course of action.

In this respect the architect is placed in a different, and less agreeable position. It is true he is engaged by his client to do certain work, and by his client he is paid for doing it ; and so far a position of servitude is imposed upon him. But in carrying out his client's business a third party has to be dealt with, who, in the course of a few hours after the commencement of building operations, has vested interests in the matter which must be considered. And at this stage of proceedings the architect, like Desdemona, perceives "a divided duty"—a divided duty, however, which can be faithfully performed towards both parties, provided they all understand the relation in which they stand to one another.

It will therefore be of no small advantage if the relationship of the three parties is clearly defined. As the architect is as it were the central figure in the trio, it will best serve this purpose if in this paper a statement is given of the relation in which an architect stands towards his client, and, in a subsequent paper, the relation in which an architect stands towards the contractor. By this means the mutual relationship of the three parties will be better understood.

As a rule when a client seeks the advice and services of an architect, he has what may be termed a clearly indefinite idea of his own requirements. And it is here, at the very outset, that an architect has to call into activity all the tact and diplomacy with which he is gifted. By cross-examination, careful angling, leading suggestions, any process in fact which the circumstances may require, he must sift his client so as to ascertain his purposes in regard to the building he proposes to erect. This done, he must give them shape, and in doing so he must be guided more by his own knowledge and experience than by any suggestions his client may have given him. These in many instances will be found to be altogether impracticable, or entirely contrary to the general arrangements intended to be carried out. At the same time there are few men who have not some peculiarity, "fads" if you will, which they consider almost essential to their comfort, or to the purpose of their building. The architect must of course give such emphasis and force to any particular leanings of his client as the case may require. But he must carefully guard against what he knows to be extravagances or excresences. The probability is that the client wants more for his contemplated outlay than it is possible to give him ; and it will only result in disappointment and vexation if the architect does not from the first take hold of the reins in the matter of expenditure. And this is a point on which architects seldom have justice done them. The opinion prevails that, because an architect's remuneration for his services is based on the cost of the building, it is to his interest to run up expenses. That looks feasible and natural. But does it not seem more feasible and more natural, that he will exercise all his knowledge of the science of construction and art of architecture to accomplish the greatest results, with the least possible outlay? It must surely be evident to every man that this is at once the most honorable, and the most profitable course for an architect to pursue.

Having then, by illustrations and sketches, established a mutual understanding between himself and his client, as to the requirements of the latter, the architect must now prepare the contract drawings. This, indeed, forms the most important part of his work, for with the specifications, the contract drawings constitute the common standing ground to be occupied by the client, architect and contractor. They set forth what the client is to receive, and what the contractor is to give for a stipulated sum of money, and what the architect is to require for his client at the hands of the contractor. It is therefore of the utmost importance that they should be prepared with the greatest care, and that in developing the ideas interchanged in the earlier stages of the proceedings, the limits of size and cost should not be exceeded. Up to this point the architect has been acting wholly in his client's interests, as indeed he will continue to do until the building is completed ; but, hitherto, without any disturbance to their mutual harmony arising by the presence of a third party. The contractor is still unknown to him, and a stranger. But when the contract is signed and operations have commenced, then the contractor becomes an important factor in all subsequent arrangements. It is then that the architect occupies very much the same position as a judge. He must act with the most scrupulous impartiality between his client and the contractor. On his client's behalf he must guard against any work being done or material being used in his building that is of a quality inferior to what has been specified and contracted for. He must see that the design and specifications that have been approved and signed in good faith, are in as good faith carried out. And if, in the progress of the building, anything should occur to him that will beneficially or economically affect it, it will be his duty to consult with and advise his client thereupon. In short, he must see that his client gets, what he may reasonably have been expected to get, both of the contractor's labor, material and skill, and of his own time, experience and ability, for the amount of money he has agreed to pay for them. But, on the other hand, he must also prevent his client from imposing work upon the contractor which has not been agreed upon, or of requiring of him a superior quality of materials than has been stipulated for. Fair dealing,—the most absolutely fair dealing,—must be the distinguishing characteristic of an architect in the conduct of his business. An unfair man is not fit to hold such a position.

Then, in the settlement of the building accounts, the principle of fairness and impartiality must dominate the action of an architect, always keeping in view, of course, the nature of the agreement which has been entered into between the client and the contractor. This agreement (with the drawings and specifications,) now forms the basis of settlement. For so much money the contractor has agreed to perform so much work in such and such a manner. If no change has taken place in the design, and if the labor and material have been satisfactory, then all that remains for the architect to do is to put his name to the account and request his client to pay it. But experience shows that in building, as in everything else, we cannot proceed very far without having to reckon with the law of change. And if changes have taken place, as in all probability they have, the architect will have been very remiss in his duty if he has not kept his client informed of them, and of the additional cost they are likely to entail upon him. In the majority of cases it is true the changes in a building during its progress are suggested by the client himself. But a variety of circumstances may arise which demand that alterations be made ; and which being in the interest of his client, an architect has power to make. Still, these must be reported to the client if an architect will faithfully perform his duty and avoid the irksomeness and unpleasantness of a disagreement over the settlement of the accounts. If, however, the architect has kept his client "posted" as to the changes that have taken place, he must be careful now

to prevent any overcharge being made in respect of them. He must allow of no claim for extras,– that nightmare that disturbs the first dreams of every one who contemplates building, and haunts him till its completion—where an intelligent comparison of plans and specifications, and the evident purpose and intention of both, will allow of none. But such alterations as have taken place by written authority or agreement, he must value at a fair and reasonable price, in proportion to the original contract sum, adding to or deducting from that amount as the case may be. And here it may be said, in passing, if a system of tendering for buildings by bills of quantities were adopted in Canada, similiar to that which exists in Great Britain, a great deal of unpleasantness would be avoided, and a much more satisfactory and equitable result arrived at, in the settlement of building accounts.

It will be quite apparent from what has already been stated, that some very important duties of an architect have not been touched upon. But as they fall more within the sphere of his relation to the contractor, it will be better to deal with them in another paper.

OUR ILLUSTRATIONS.

HOUSE AT NEEDHAM, MASS., FOR MR. CLARENCE H. HATHAWAY —KNOX, ELLIOT & JARVIS, ARCHITECTS, TORONTO.

UNIVERSITY OF TORONTO NEW BUILDINGS FOR BIOLOGICAL DEPARTMENT.—DAVID B. DICK, ARCHITECT, TORONTO.

ONTARIO ASSOCIATION OF ARCHITECTS.

ARRANGEMENTS are being completed by the officers of the above Association for the first annual convention to be held in Toronto on Wednesday and Thursday, Nov. 21st and 22nd. The place of meeting has not been definitely decided upon, but will probably be the Canadian Institute building.

In addition to the opening address of the President, interesting reports may be looked for from the Committees entrusted with the furtherance in various directions of matters affecting the interests of the profession, with the discussions consequent thereupon ; also the reading of papers on "Professional Ethics," by Mr. Edmund Burke ; "Competitions," and "The Relations of Architects to their Clients," Mr. S. G. Curry, ; "Ventilation," Mr. D. B. Dick ; "H. H. Richardson and his Work," Mr. W. A. Langton ; "Foundations," Mr. H. B. Gordon ; "Office Management," Mr. R. W. Gambier-Bousfield.

This meeting should be made a success if it requires the efforts of every member towards that end. The question of incorporation will come up and surely every member is sufficiently interested in that matter alone to cause him to give some thought to it and bring him to Toronto to take a hand in the discussion. It is proposed to give ample time for the thorough discussion of the proposed Bill, as the views of every member is desired. It is hoped that the members outside of Toronto will take sufficient interest in this convention to take an active part. So far no papers have been volunteered by any but Toronto men. In fact letters have been addressed to the Directors living out of Toronto asking them to assist in obtaining papers, and so far they have not even acknowledged their receipt. We do not understand their apathy, and must certainly hold them guilty of neglecting their duties. The Toronto men do not wish to manage or run the whole affair, but if they cannot receive any assistance even when they take the trouble to ask for it, they must not be blamed if they seem to be the controlling and energizing influence of the Association. Action speaks with much greater force than loud or continued talking. Let us work before this meeting and do the talking at the meeting.

The social features of the occasion are not being overlooked. They will include a dinner and a drive to the principal points of interest in the city. Architects from cities and towns outside of Toronto will not be asked to contribute anything towards defraying the cost of entertainment. We desire to draw the attention of members again to the exhibition of drawings which it is proposed to hold while the convention is in session. Drawings of meritorious work, whether new or old, are earnestly solicited. A considerable number of the resident architects have signified their intention to contribute sketches to this exhibition, but the number of such offers from outside points is not what the management would desire. We would urge every architect who can do so to contribute to make this exhibition a success, and to correspond immediately with the Secretary of the Association on the subject. We look forward hopefully to a largely attended, pleasant and profitable gathering on the occasion of the approaching convention.

A KINDLY INVITATION.

CINCINNATI ARCHITECTURAL CLUB,
CINCINNATI, Oct. 7th, 1889.

Editor CANADIAN ARCHITECT AND BUILDER.

DEAR SIR,—I send enclosed copies of circular, etc., issued in connection with the proposed National Exhibition of Architectural Drawings and Sketches, to be held in this city contemporaneously with the joint convention of the American Institute and Western Association of Architects. As you see in our circular, the exhibition is open to receive contributions from Canada as well as the United States, and I certainly hope that our Canadian brethren will not be backward in making use of this invitation. On the 16th of last month I sent copies of these circulars to the Secretary of the Architectural Draughtsmen's Association of Toronto, but we have received no reply or notice of their intentions. To you, therefore, as the recognized organ of the profession in Canada, we would entrust our interest in the collection of an exhibit that will do credit to your city at least. You should understand that contributions are not confined solely to the individual works of draughtsmen, but may also include the efforts of all practising and egitimate architects. As you will notice, we pay all costs for transportation, hanging and returning, and in addition we purpose to insure all drawings while in our possession, The responsibility of the Express Co. is practically sufficient insurance during transportation.

From the *American Architect* we have noticed and followed the organization and development of the Ontario Association of Architects. Why can't we get them, as an Association, to undertake a collection of drawings from among their members to enter our lists? Please urge this matter for us, and do what you can. If it would be of any interest to your readers to know who are going to contribute, I could arrange to keep you generally posted. Meantime, I can give the names of the following artists who have already notified us of their intention to forward contributions: From Boston—water-colors from K. S. Peabody, C. Howard Walker, R. Clifton Sturgis, C. H. Blackall; pen and ink from D. A. Gregg, F. H. Bacon, R. C. Stingis, E. Eldon Deane. From Minneapolis—Harvey Ellis, A. B. Chamberlain and others. New York—Henry P. Kirby. Chicago Architectural Sketch Club; Detroit Architectural Sketch Club; Boston Architectural Club; Columbus Architectural Sketch Club; St. Louis Architectural League; Rochester Architectural Sketch Club; St. Paul Architectural Sketch Club; Denver Architectural Sketch Club.

Yours very truly, G. W. E. FIELD,
Pres. C. A. C.

[We beg to assure the Architectural Club of Cincinnati that the members of the profession in Toronto, and we venture to say throughout Canada, reciprocate heartily the fraternal feeling so clearly manifest in the above letter. They esteem it an honor to be accorded the privilege of representation at the forthcoming National Exhibition of Architectural Drawings. Unfortunately, however, circumstances render it impossible for Canada to be represented on this occasion. The annual convention of the Ontario Association of Architects will take place simultaneously with the joint convention to be held at Cincinnati, and arrangements have also been made for an exhibition of Architectural drawings during the two days of the convention. It will thus be seen that Canadian architects are debarred from availing themselves of the invitation so kindly tendered them by their American brethren. At some future time they hope to be in a position to do so. Another serious obstacle in the way of Canadian architects who may desire to send drawings to the United States is the trouble and annoyance encountered in connection with customs departments of both countries.—EDITOR C. A. & B.]

"CANADIAN ARCHITECT AND BUILDER" SERIES OF PRIZE COMPETITIONS.

THE following is a list of competitions in Architectural subjects which we have decided to hold during the winter :—

1st.—Plans of a serving pantry, 100 square feet in size, showing cupboards, shelving, etc., with details of same. Plans to be sent in on or before 1st November next. First prize $5 ; second, one year's subscription to CANADIAN ARCHITECT AND BUILDER.

2nd.—Designs for three plaster cornices of 20 inchse, 25 inches and 30 inches girth; and of three centre pieces of 15 inches, 20 inches, and 25 inches diameter. Designs to be sent in on or before 1st December next. First prize, $5 ; second, one year's subscription to C. A. & B.

3rd.—Essay on Plumbing. Essays to be sent in on or before 1st Jan. 1890. First prize, $10 ; second, one year's subscription C. A. & B.

4th.—Designs with details for a verandah running across the front of a house 40 feet wide, and an outside wooden porch to a front door. Designs

to be in on or before 1st Jan, 1890. First prize, $5; second, one year's subscription to C. A. & B.

5th.—Designs with details for front doors and vestibule. Designs to be sent in on or before 1st Feb. 1890. First prize, $5; second, one year's subscription to C. A. & B.

6th.—Details of the interior of a small house to include those for staircase, doors, architrave, base and windows. Designs to be sent in on or before 1st March, 1890. First prize, $10; second, one year's subscription to C. A. & B.

7th.—Design with details for four mantels, two of wood, one of brick and one of stone. Designs to be sent in on or before 1st of April, 1890. First prize, $5; second, one year's subscription C. A. & B.

8th.—Three designs, with details, for front fence. Designs to be sent in on or before 1st May, 1890. First prize, $5; second, one year's subscription C. A. & B.

9th.—Essay on Heating and Ventilation. Essays to be sent in on or before 1st May, 1890. First prize, $10; second, one year's subscription C. A. & B.

10th.—Plan of a bath room for a medium sized house, showing the best position of fixtures; not more than five fixtures to be shown, or more than 75 square feet devoted to the bath room. Plans to be sent in on or before Jan 1st, 1890. First prize, $5; second, one year's subscription C. A. & B.

The Architectural Guild of Toronto have very kindly appointed a committee from their number to judge the above competitions. We shall publish each report as sent to us by the committee. Draughtmanship neatness and clearness of arrangement of drawings will be taken into consideration in awarding positions.

Drawings must be made on sheets of heavy white paper or bristol board, 14 x 20 inches in size, and must be drawn to allow of their being reduced to one-half the above size. Drawings must be made in *firm, strong lines*, with pen and *black* ink. No color or brush work will be allowed.

Each drawing must be marked with the *nom de plume* of its author, and the author's name, *nom de plume* and full address, enclosed in sealed envelope, must accompany each drawing sent in.

We reserve the right to publish any design sent in.

Drawings will be returned to their authors within a reasonable time after the committee has given its decision.

THE VIADUCT SCHEME.

THERE seems to be a concensus of opinion that a viaduct should be built along the city front with the object of running the railway tracks from the level. There can be no doubt as to the very great benefit which would result to the city and its inhabitants if the dangers of the bay front were removed. That they will be removed, is only a question of time. If it does not become an accomplished fact at present, it will in the future, when the increased size and importance of the city will force the carrying out of some such scheme at a much greater cost than is now requisite. There are, as might be expected, many opinions as to the manner in which this much needed work should be constructed. Two reports by eminent and capable engineers have been prepared and are now before the public for consideration. While in the main these reports agree, they differ very materially in detail. One recommends an iron or steel trestle, the other an embankment between retaining walls of masonry. There are many questions of detail referred to in the reports which do not bear to any great extent on the main questions as to the raising of the tracks. Such questions can be settled only by the parties interested. What is required is, that a general scheme should be laid down, after which the minor points can be discussed. Mr. Wellington recommends an iron or steel structure with four tracks, the erection of a Union Station on the Parliament Block, pressing back of the railways to the west of York street, the opening of a freight yard in the east end, and a swing bridge over the Don. Messrs. Gzowski & Shanley favor an earth embankment between retaining walls, the building of a station on the site of the old Parliament buildings, and tracks to the south of the embankment for the unloading of freight along the bay front. It now remains to adopt one or other of these schemes, or combine them into one scheme, or with the information they supply and such additional as may be obtained, build up a more complete and perfect one. For ourselves, we are of the opinion that the solution of the question has only been entered upon. The solution is made very much more difficult owing to the very heavy outlay which must be incurred, and the magnitude of the interests involved. The carrying out of the most thorough scheme might be too great a burden for the city. It is, therefore, a question which must be solved from two points, the engineering and the financial. The engineer might easily evolve a scheme which the finances of the city could not meet. Engineer and financier must together solve the question.

Two months ago we advocated a scheme which the reading of the above reports has convinced us is practicable, and in the end much the better investment, although it would entail a larger amount of outlay. Mr. Wellington and Messrs. Gzowski & Shanley in their scheme surrender up a strip of land of at least 60 feet by the entire length of the viaduct or embankment. That such land is most valuable needs not to be affirmed. Whatever its value, the sum must be included in the total cost. From neither of the above schemes would any revenue be derived except whatever sum the railways would pay. According to Mr. Wellington, they should pay $2\frac{1}{2}$ per cent. on the cost of the viaduct, while they would be allowed $3\frac{1}{2}$ per cent. on the value of their land or other interest surrendered to the city. We would not be surprised that the railways would show or at least try to show that under such an arrangement the city would be entitled to pay them a yearly sum instead of them paying the city. Mr. Wellington would have done well if he had made no mention of financial questions beyond what was absolutely necessary. Nearly all his conclusions are formed on possibilities which are not at all likely to come to pass. Messrs. Gzowski & Shanley more wisely considered only the engineering problem, except in so far as it was necessary to consider the question from other points.

We will now consider the scheme we advocated in this journal with the additional information which has been supplied since it was published. We advocated the erection of a row of two storey with basement warehouses along the entire bay front from Simcoe street east, above which the railway tracks could be placed. The party walls between these warehouses would have to be made heavy enough to bear the girders on which the railway tracks would be carried. As the spans need not be greater than 30 feet the girders would not be heavy, nor would the party walls require to be made of any great additional thickness to carry the tracks. This scheme makes full use of the ground occupied by the tracks, and allows of a direct return in the form of rents to meet the interest charge. The warehouses could be made 100 feet deep from north to south, and having good light, would rent readily. The railway tracks could be placed on the north side and only the necessary length of party wall to carry tracks made heavier than usual in warehouse work. If the railways required 50 feet, there would still be left an equal amount on the south side, which could be made a magnificent promenade. That such promenade would be of great value all will admit, as it would be within easy reach of thousands, and would have the refreshing breezes of the lake continually blowing across it. The view of the bay and lake would be well worth any exertion necessary to reach the promenade. Elevators could be placed at all the main thoroughfares by which the top could be gained by paying a small fee. We would make no change in wharfage, etc., from that suggested two months ago. If the elevator system suggested at that time could not be made of sufficient value, it could be left out, and tracks laid along the south face of warehouses which would allow of goods being delivered directly into the warehouses. Warehouses thus placed in direct connection with the railways entering the city and alongside a wharf should find tenants at high rentals. We doubt not but that many parties would be willing to build the width of a warehouse in length of the viaduct if they were given a twenty or twenty five years' lease of the warehouse they erected. The spans thus formed under the viaduct could be used for a great number of purposes—warehouses in the most central part, factories, etc., at a greater distance from the business centre, and storage and coal yards in the least valuable positions. That every part of the space under such a viaduct could be rented at figures which would go a long way towards paying the interest charge on the cost of the entire structure is almost a certainty. That the rents would pay a very high interest rate on the additional cost which would be incurred in constructing warehouses, etc., beneath the tracks, over and above the amount required for either a steel trestle or an earth embankment, should not require to be stated, as it should be clear to every one. By the warehouse scheme the land occupied by the viaduct is made of value, and a return is obtained. By either of the other schemes the land is lost. The property on the Esplanade will be increased very much in value by the warehouse scheme beyond what it would be increased by either the steel viaduct or earth enbankment scheme.

We do not approve of the station scheme brought forward in either of the reports. A station with six tracks in it, all of which must be reached by passing over the intermediate ones as is done in Buffalo and Rochester stations, is not in our opinion a good arrangement. A station where the trains enter and leave from platforms running out from a main platform is the best arrangement for a station. But this plan cannot be adopted for the Toronto station, as trains must be able to pass through the station in either direction. Such being the case, the next best arrangement is one whereby the different platforms may be reached by means of a passage below the tracks as is done in one of the stations in Manchester, Eng. We gave the level of the tracks at 32 feet above the Esplanade. Front street is 14 feet above, which would place the tracks 18 feet above Front street. The station yard could be raised 5 feet which, with the floor of the waiting room 3 feet above yard level, would make the level of the passage way 20 feet above the Esplanade and 10 feet below the level of tracks. This would give 8 feet clear head room in passage, and necessitate a lift of about 12 feet to the train platform. To gain the train platform we should make runs in both directions of an easy grade, and also place stairs at the side of main passage. The above arrangement would make it impossible for people to take the wrong train, or in any way to get upon the tracks. There would be two baggage rooms, one at each end of the station, for east and west baggage, which would allow of the handling of all baggage without blocking up the platform or interfering with the passengers. The baggage trucks could be lifted from the level of the baggage room by lifts. The entire space below the station would be used as a freight shed, thus making full use of the increased height of the building. The freight shed would be lighted down through the station building from the roof lights by pavement lights let in between the tracks between the platforms. That a most complete and commodious station could be planned on the above lines we are confident, and if time allows we will show that it can be done by making and publishing a plan at an early date.

We have every confidence in our scheme, and will take the trouble to put it into a more definite form when we can find the necessary time to work it up. The city of Toronto should not be content to do this thing in an imperfect way, but should take every care to work out a scheme which will meet the wants of the future in so far as they can be foreseen. We have had one badly muddled scheme in the Don improvements, which were entered upon without any very definite plan, except it was to spend money. his viaduct matter should be most thoroughly worked out and weighed in l points, and nothing done until everything has been provided for. What

is done in a hurry is generally badly done. Time given to perfecting a scheme at the beginning saves time in correcting blunders at the end.

Since the above was written we have seen in the *Mail* the outlines of a scheme by Messrs. McLennan, Stewart & Chapman. They go into figures to prove that warehouses under the tracks would pay. With this we agree. If this scheme had appeared before that outlined in this paper in August, it would have been a step in advance. As it is, it only supports the one suggested by us. This scheme has faults, and does not make full use of the opportunities offered. In fact it is in an exceedingly crude condition. The difference in levels of the tracks would result in the lower tracks being entirely covered by an embankment of snow every time we had a heavy storm. This method of hoisting is of the past and would not meet present requirements. They only have one storage floor, while our scheme would give three, and only require the tracks to be raised 32 feet, instead of 38 feet as their scheme calls for. That they did not see the article in this paper is evident, or they would have brought forward a much better digested scheme. However, the more schemes good and bad brought forward, the easier will be made the solution of this all-important question to the commercial interests of Toronto, and the improvement in the facilities for its inhabitants to obtain better health, by being given free access to the beneficial lake breezes.

THE QUEBEC DISASTER.

QUEBEC, Oct. 7th, 1889.

Editor CANADIAN ARCHITECT AND BUILDER.

SIR,—In compliance with your request of the 30th ult. for an article on the late land slide in this city, let me premise by saying that the whole Quebec promontory or rock on which the citadel and city are built, is not, like the Laurentian hills and mountains in the near vicinity, a compact mass of gneiss or so called granite, but formed of a series of parallel strata of a schistous and lamellar structure, geologically called, I believe, "Utica Slate."

These strata of a sedimentary nature and therefore originally more or less horizontal, have by some cataclysm of bygone days, been tilted up in a way to become nearly vertical; the strata towards the north side of the cliff inclining over or dipping inland, while towards the south and east they incline or dip towards the St. Lawrence, as more fully set forth by the Revd. Mr. Laflamme, of the Laval University M. R. S. C.

"The rocks composing these strata are far from being, all of them, solid and homogeneous. They are of different thickness, varying from feet to inches. They are fissured and cracked in directions more or less perpendicular or inclined to the lay of the beds, though generally parallel to the plane of clearage.

Water has entered for centuries at the crop out of several of the beds which under the influence thereof and that of frost and other climateric causes, have become disintegrated, reduced to rotten shale of a very thin lamellar texture, which can be extracted by the hand, and bordering, so to say, on a return to their original clay; thus dividing the more solid beds and bringing about a separation of the strata as indicated at the several crevasses hereinafter alluded to. In a word, the whole face of the cliff for some hundreds of feet north and south of the land slide and for many feet in depth towards the interior is of a loose and demoralized texture, and hence the danger."

The summit or highest point of the land slide, immediately underlies the salient angle of the fortification wall at the south end of Dufferin Terrace, which is built over the old carronade battery still to be seen beneath the terrace flooring at this point.

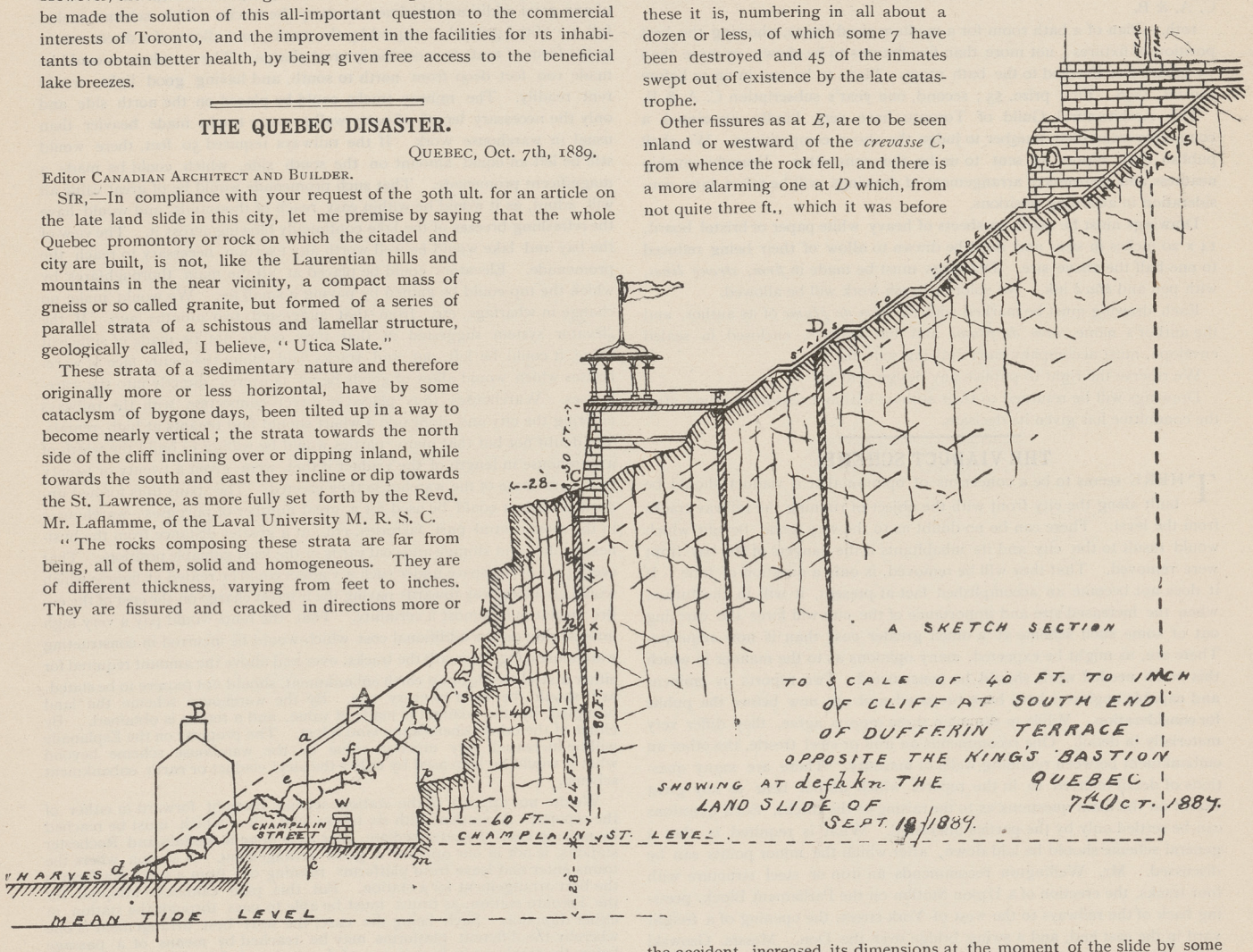
The terrace floor or promenade is at 182 ft. above mean tide level of the St. Lawrence. The wall supporting the terrace at its south extremity, is some 30 ft. in height. Champlain street is some 28 ft. above mean tide level at the site of the accident, and the cliff, therefore, at this point, about 124 ft. high above Champlain St.; the section or stratum of rock, a portion of which has given away being 60 ft. wide at base, 28 ft. at summit, and say of an average thickness of 40 ft.

The accompanying sketch is a section of the cliff at about the centre of the land slide and at its highest point; the cliff as it was before the occurence, being shaded by hatchings along its outer edge or outcrop, while the surface of the fallen rock is roughly shown at *d e c h k n*; the portion which gave way being that between *k* and *n*, along the line of fissure or *crevasse C N*, where the height from *C* to *N* is about 44 ft., while the length or extent of the fallen portion may be about 300 ft.

In Jan., 1880, at the request of Sir H. Langevin, Minister of Public Works of the Dominion, I reported as to the dangerous features of the rock and recommended that: either buttresses, *a c m p q s k b*, be erected at intervals of some 20 to 30 ft., be some 30 ft. high at *a*, 80 ft. at *b*, to prevent the rock from falling, which should it do, I said, would destroy the houses on both sides of Champlain St., and sacrifice the lives of all the inmates; or that the houses be purchased and demolished, thus in either case saving the lives of the tenants or occupants.

This second or alternative scheme was decided on, but only partly carried out, by purchasing and demolishing the houses at *A* on the rock side of the street, while those at *B* on the opposite side were allowed to remain, and these it is, numbering in all about a dozen or less, of which some 7 have been destroyed and 45 of the inmates swept out of existence by the late catastrophe.

Other fissures as at *E*, are to be seen inland or westward of the *crevasse C*, from whence the rock fell, and there is a more alarming one at *D* which, from not quite three ft., which it was before



What I propose to counteract the overthrow of that portion of the cliff between *C* and *D*, some 80 ft. or more in width, is, that the upper portion of the rock from *C* towards *D* and down to *t*, be cut away in large masses of a cubic yard or more, and allowed to fall on top of the present *debris*, and trimmed off to the line of slope *d t*, which is one and a half base to one vertical; thus imitating the levelling hand of time, and by thus staying the base of the cliff, prevent the fall of the section of rock between the *crevasses C & D*, which portion is now more secure at this point of the cliff on account of the abutting *debris* from *d* to *n* than it was before the slide occurred.

To do this, a portion of the south end of the terrace must be sacrificed, the kiosk being removed to a point above *D*, to which the promenade may still extend by an incline or by a flight of easy treads from the present terrace level opposite the end of Des Carrieres St. Or the terrace, if the additional expenditure of some $20,000 to $30,000 for the purpose be warranted and can be afforded, may be kept intact by procuring elsewhere the required material—some 10,000 to 15,000 cubic yards more or less—and dumping it down from above on the present *debris*; or, as proposed by Mr Light M. I. C. E., though of course at still greater cost, by building a continuous buttress of solid cement masonry, of such a breadth of base and such a height as to prevent all future alarm and danger.

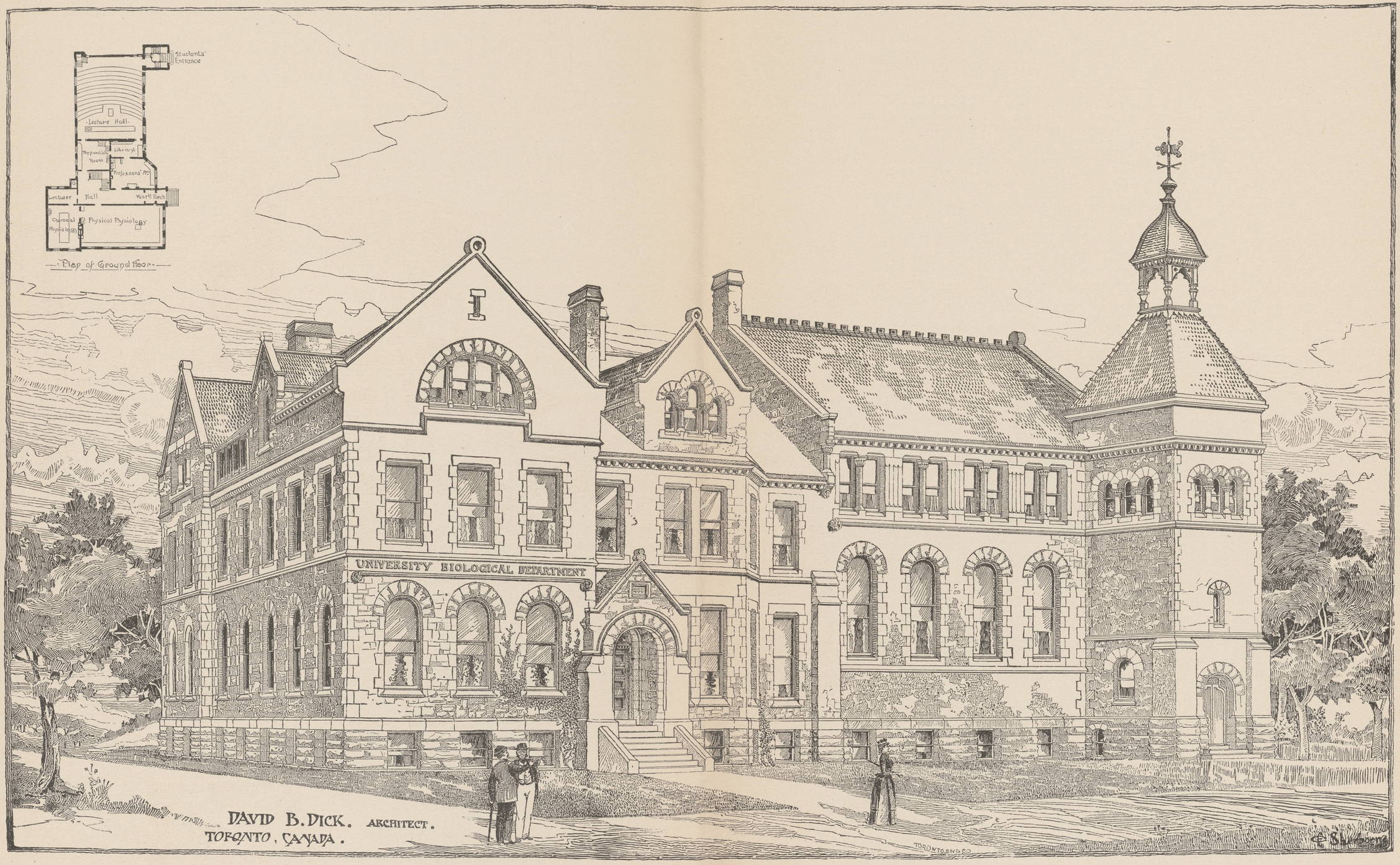
CHAS. BAILLAIRGE,
City Engineer.

First Floor Plan

TORRENS & Co.

House at Needham Mass.
for Clarence H. Hathaway Esq.

Knox, Elliot & Jarvis, Architects.
Toronto.


Students' Entrance
Lecture Hall
Preparation Room
Library
Professors' Rd
Lecturer
Hall
Vest'd Porch
Chemical Physiology
Physical Physiology
Plan of Ground Floor
UNIVERSITY BIOLOGICAL DEPARTMENT
DAVID B. DICK. ARCHITECT.
TORONTO, CANADA.

HOW TO ESTIMATE.

By "Cato."

FIGURING up trenches, the plan of which is a trapezoid, is done by first finding the area, by adding the sums of the ends together and dividing by two for a mean width. The result, multiplied by the length, will give the area, which is multiplied by the depth of the trench to get the solid contents or quantity to be excavated.

A like process can be employed if the depth of the excavation be a trapezoidal section by adding the greater and lesser depth together and dividing their sum by two for an average or mean depth, and multiplying by the superficial area as before to gain the solidity.

The area of an excavation whose plan is rhomboidal is found by dividing it into two equal triangles, and calculating the area of one by multiplying the common base, A, B, by half the perpendicular height, the result of which doubled, equals the area.

Wells or other cylindrical excavations come under the head of cylinders, and can therefore be calculated by the rule covering it. For instance, if any one wishes to find the cost of digging a well or vault, say 10 feet in diameter, to a depth say of 12 feet, proceed by using this formula :

First multiply 10:0 x 3.1416, which, multiplied by 12=the number of cubic feet to be excavated.

It often seems strange that the cost should be figured up per cubic yard but if the estimator wishes to be more accurate he can figure per cubic foot, or per thousand feet, according as he wishes. It is a very good plan when estimating an excavation of great length and varying depth, to figure up the cost of one section of 10, 50, or 100 feet in length, multiplied by the width and mean depth ; then to find the number of times this length will divide into the entire number of feet to be excavated.

STONEWORK.

Contractors for stonework usually estimate by the perch and cubic foot, though it is sometimes done by the square foot or square yard. A perch of stone or stone masonry measures 16½ feet long, 1½ feet wide and 1 foot high. It contains 24¾ cubic feet in the solid or in the quarry. When built in the wall 22 cubic feet make a perch, 2¾ cubic feet being deducted for the mortar and filling.

It is usual to allow about three pecks of lime and 4 bushels of sand to a perch of masonry, but in New York and other American cities proportions of half and half and often one peck of lime to 4 bushels of sand is put in.

In ordinary square work, as footings and cellars, multiply the length, breadth and height together, to find the number of cubic feet it contains, and divide by 24¾ or 24.75 to find the number of perches it contains. Divide by the above number when the stone is laid dry ; if bedded in mortar, divide by 22 thus : how many perches in a wall 60 feet long, 4 feet 6 inches high, 15 inches thick.

60
4½
240
30
270
67½
337½ cubic feet.
337½ ÷ 24¾ = 13 7-11 perches in wall.

Sash frames with sash weights, locks and trim complete, may be taken out of old buildings that are being taken down and preserved just as good as new by screwing slats and braces on them, which not only keeps the frame square, but prevents the glass from being broken. Doors, frames and trims may also be kept in good order until used, by taking the same precaution as in window frames.

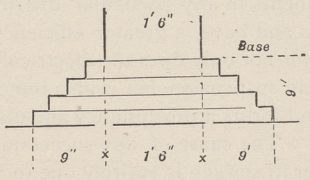
RULES FOR THE THICKNESS, ETC., OF BRICK WALLS

ACCORDING TO THE METROPOLITAN BUILDING ACT (LONDON, 1855).

NOTE.—Subsequent Metropolitan Building Acts made no alterations in these rules.

RULE FOR FOOTINGS.

The projection of the footing at the bottom of every wall on each side shall be at least equal to one half the thickness of the wall at its base. The diminution of the footings shall be in regular offsets, and the height from the bottom of the footing to the base of the wall shall be at least equal to one half the thickness of the wall at its base, the base of the wall being the first course above the footings. *Example*:



Here the wall at its base is 1 ft. 6 in. thick, therefore the projection on each side must be at least 9 in., and the height from the bottom to top of the footings must also be 9 in.; not less.

Bricks are here supposed to be not less than 8½ in. long or more than 9½ in. long.

EXTRA HEIGHT OF A STORY.

If any story exceeds in height the thickness prescribed in the tables below for that story multiplied by 16, the walls of that story must be increased in thickness one-sixteenth part the height of the story.

Example—Height of story, say 17 ft. 4 in.
Thickness of wall described, 13 in.

Now, as 17 ft. 4 in. is sixteen times the thickness of the wall, the wall is to be thickened by one-sixteenth the whole height, or 13 in., making 26 in. the correct thickness,

But this extra thickness may be confined to piers distributed properly, the total widths of the piers being equal to ¼ the whole length of the wall.

Example—Extra thickness is 13 in.
Total length of wall, say 30 ft.
¼ length of wall is 7 ft. 6 in.
The width of the piers must together equal 7 ft. 6 in.

You have therefore a wall 17 ft. 4 in. high, 30 ft. long, 13 in. thick, with four piers that are each 1 ft. 10½ in. wide on face.

No story enclosed with walls less than 13 in. thick shall be more than 10 ft. high.

DWELLING HOUSES.

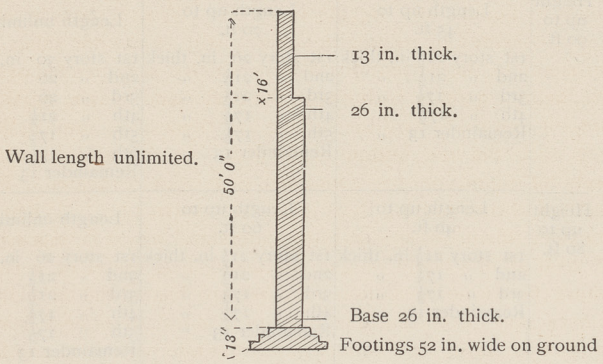
The following tables give the heights of the walls in the left hand column, and the lengths in the corresponding horizontal columns. The lengths of the walls are supposed to be curtailed by return walls at either end, and the length of the wall is measured from center to center of the return walls.

I.	II.	III.	IV.
Height up to 100 ft.	Length up to 45 ft.	Length up to 80 ft.	Length unlimited.
	1st story 21½ in. thick	1st story 26 in. thick	1st story 30 in. thick
	2nd " 21½ "	2nd " 26 "	2nd " 26 "
	3rd " 17½ "	3rd " 21½ "	3rd " 26 "
	4th " 17½ "	4th " 21½ "	4th " 21½ "
	5th " 17½ "	5th " 17½ "	5th " 21½ "
	Remainder 13 in. "	6th " 17½ "	6th " 17½ "
		Remainder 13 in. "	7th " 17½ "
			Remainder 13 in. "
Height up to 90 ft.	Length up to 45 ft.	Length up to 70 ft.	Length unlimited.
	1st story 21½ in. thick	1st story 26 in. thick	1st story 30 in. thick
	2nd " 21½ "	2nd " 21½ "	2nd " 26 "
	3rd " 17½ "	3rd " 21½ "	3rd " 26 "
	4th " 17½ "	4th " 17½ "	4th " 21½ "
	Remainder 13 "	5th " 17½ "	5th " 17½ "
		Remainder 13 "	6th " 17½ "
			Remainder 13 "
Height up to 80 ft.	Length up to 40 ft.	Length up to 60 ft.	Length unlimited.
	1st story 21½ in. thick	1st story 21½ in. thick	1st story 26 in. thick
	2nd " 17½ "	2nd " 21½ "	2nd " 21½ "
	3rd " 17½ "	3rd " 17½ "	3rd " 21½ "
	Remainder 13 "	4th " 17½ "	4th " 17½ "
		Remainder 13 "	5th " 17½ "
			Remainder 13 "
Height up to 70 ft.	Length up to 40 ft.	Length up to 55 ft.	Length unlimited.
	1st story 17½ in. thick	1st story 21½ in. thick	1st story 26 in. thick
	2nd " 17½ "	2nd " 17½ "	2nd " 21½ "
	Remainder 13 "	3rd " 17½ "	3rd " 21½ "
		Remainder 13 "	4th " 17½ "
			Remainder 13 "
Height up to 60 ft.	Length up to 30 ft.	Length up to 50 ft.	Length unlimited.
	1st story 17½ in. thick	1st story 17½ in. thick	1st story 21½ in. thick
	Remainder 13 "	2nd " 17½ "	2nd " 17½ "
		Remainder 13 "	3rd " 17½ "
			Remainder 13 "
Height up to 50 ft.	Length up to 30 ft.	Length up to 45 ft.	Length unlimited.
	Wall below topmost story 13 in. thick	1st story 17½ in. thick	1st story 21½ in. thick
	T'pm't st'y 8½ "	Rest of wall below topmost st'y 13 in. thick	2nd " 17½ "
	Remainder 8½ "	T'pm't st'y 8½ "	Remainder 13 "
		Remainder 8½ "	
Height up to 40 ft.	Length up to 35 ft.	Length unlimited.	
	Wall below 2 topmost stories 13 in. thick	1st story, - - 17½ in. thick.	
	2 topmost stories 8½ "	Rest of wall below top story 13 "	
	Remainder 8½ "	Topmost story - 8½ "	
		Remainder - - 8½ "	
Height up to 30 ft.	Length up to 35 ft.	Length unlimited.	
	Wall below 2 topmost stories 13 in. thick	Wall below top story - 13 in. thick.	
	2 top. st'ys 8½ "	Topmost story - - 8½ "	
	Remainder 8½ "	Remainder - - 8½ "	
Height up to 25 ft.	Length up to 30 ft.	Length unlimited.	
	From base to top of wall 8½ in. thick	Wall below top story - 13 in. thick.	
		Topmost story - - 8½ "	
		Remainder - - 8½ "	

WAREHOUSES, MANUFACTORIES, BREWERIES, ETC.

Height up to 100 ft.	Length up to 55 ft. Base 26 in. thick.	Length up to 75 ft. Base 30 in. thick.	Length unlimited. Base 34 in. thick.
Height up to 90 ft.	Length up to 60 ft. Base 26 in. thick.	Length up to 70 ft. Base 30 in. thick.	Length unlimited. Base 34 in. thick.
Height up to 80 ft.	Length up to 45 ft. Base 21½ in. thick.	Length up to 60 ft. Base 26 in. thick.	Length unlimited. Base 30 in. thick.
Height up to 70 ft.	Length up to 30 ft. Base 17½ in. thick.	Length up to 45 ft. Base 21½ in thick.	Length unlimited. Base 26 in. thick.
Height up to 60 ft.	Length up to 35 ft. Base 17½ in. thick.	Length up to 50 ft. Base 21½ in. thick.	Length unlimited. Base 26 in. thick.
Height up to 50 ft.	Length up to 40 ft. Base 17½ in. thick.	Length up to 70 ft, Base 21½ in. thick.	Length unlimited. Base 26 in. thick.
Height up to 40 ft.	Length up to 30 ft. Base 13 in. thick.	Length up to 60 ft. Base 17½ in. thick.	Length unlimited. Base 22½ in. thick.
Height up to 30 ft.	Length up to 45 ft. Base 13 in. thick.	Length unlimited. Base 17½ in. thick.	
Height up to 25 ft.	Length unlimited. Base 13 in. thick.		

The thickness of the top of walls of this class and for sixteen feet below the top to be 13 inches, except when the wall is not more than 30 feet high, when it may be —— 8½ inches. Below this 16 ft. point from the top, the walls to be built solid, of the thickness of the base.



CROSSWALLS.

The thickness of a crosswall shall be two-thirds of the thickness described for the class of buildings to which it belongs, but never less than 8½ inches, and no wall subdividing any building shall be deemed to be a crosswall, unless it is carried up two-thirds the height of the outside walls, and unless the openings and recesses in it do not exceed one-half the vertical surface of the wall in each story.

PERSONALS.

We regret to learn that Mr. T. J. Heard, marble dealer, London, Ont., has been forced to make an assignment. It is said that this step was brought about by taking a contract at too low a figure in connection with the new public buildings at Goderich.

Mr. Thomas Hooper, architect, of Vancouver, B. C., is at present on a visit to the east, for the purpose of examining the best models of church architecture. The knowledge thus gained he proposes to utilize in preparing the plans for a new Methodist Church in Victoria.

The following is said to be a good recipe for plastering on the outside of a brick wall. Take of slaked lime 60 parts ; sand, 35 parts ; litharge, 3 parts ; knead and work the ingredients into a stiff mass with 7 to 10 parts of linseed oil ; use old oil or linseed oil varnish. It should be well worked to the consistency required and applied as other mortars, well troweled down. Or, sand, 90 parts ; litharge, 5 parts ; plaster of paris, 5 parts, moistened and worked together with a small portion of linseed oil. Oil the brick three coats before applying the cement, and trowel down.

The heavy fall rains bring the annual complaint of leaky brick walls and consequently the usual quota of ruined ceilings and plastering. The preservative for brickwork made by Samuel Cabot, of Boston, thoroughly waterproofs the brick for an indefinite time, and yet it does not change their appearance. Actual trial shows that one coat of this material is a better waterproofing than three coats of linseed oil. Besides this, linseed oil is injured by the lime of the mortar, and rendered useless by the weather, to neither of which objections is Cabot's brick preservative open. It is cheap, lasts indefinitely, waterproofs bricks without changing their appearance, and is easily applied with a brush.

SANITATION AND LIGHT

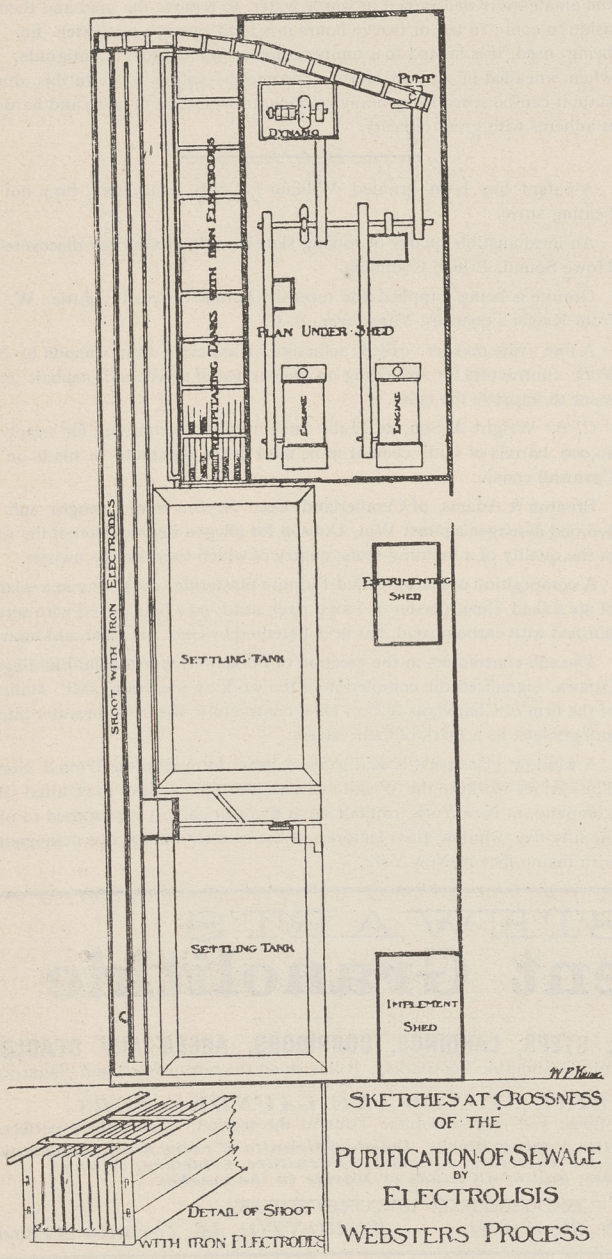
DISPOSAL OF SEWAGE BY ELECTROLYSIS.

At a meeting of the Ontario Provincial Board of Health held in Toronto on the 3rd inst., Dr. Covernton read a paper on the above subject, in which the following description was given of the *modus operandi* adopted by Mr. W. Webster F. C. S., who is engaged in extensive experiments at Crossness,' England :—

The dynamo is an Edison-Hopkinson capable of developing an energy of 43 horse power. From the dynamo the leads run through resistance frames by means of which the amount of current can be regulated without varying the speed of the engine. These are then connected with the iron electrodes in both the precipitancy tanks and shoot. The precipitancy tanks are used for taking experimental measurements, so as to discover the best mode of arranging the electrodes hereinafter called plates made of cast iron run direct from blast furnaces. The shoot is fitted with wrought iron plates, more convenient for experimental work. They are thinner and weigh less than if made from cast iron. The shoot is of wood, but in any permanent work it would be built of concrete, bricks or iron. The bottom would be lined with asphalt, or other suitable material. The sewage is discharged into the shoot from the pump connected with the main sewer. The shoot is fitted with plates. In travelling along the shoot every particle of sewage comes in contact with the plates, and finally the whole is received into one or other of the settling tanks. The plates in this shoot are divided into twelve sections. All the plates in each section are connected in parallel, and the sections can be connected either in parallel or in series, as may be most convenient. I find it best to run them arranged in six sections as series, as owing to the low tension of the dynamo it is convenient to split them up into a greater number. The dynamo should be near the center of the shoot, and practice has proved that it must be so constructed that as many sets of plates as possible may be arranged in series, but the space at my command in these works does not admit of the most effective arrangement being adopted. My experiments proved that with 27 h. p. it is possible to treat 1,000,000 gallons of sewage in 24 hours. These figures relate to average London sewage. As to the cost of engine power, the newest type of engines suitable for driving dynamos may be taken to consume two pounds of coal per h. p. per hour. The experiments carried out with reference to the amount of iron consumed by this process tend to prove that the consumption in continuous working should not be more than two grains per gallon. Here, again, the cost depends entirely upon the position of the works, or, more properly speaking, the district in which the works are situated. The plates of pig iron are one inch thick, and, if used in sufficient numbers, would last for many years when once fixed. For instance, I will take a town with a flow of 10,000,000 gallons of sewage per day, corresponding to a population of 300,000 at 30 gallons per head. To treat this amount of sewage, the consumption of iron should not exceed 464 tons per annum. On calculating the amount of mechanical power required per head of the population, I find it represents eight horse power per 1,000. It will be seen that the above plant is practically in lieu of mixing tanks, machinery and chemicals employed in the chemical processes for the treatment of sewage. If such electrical plant is designed to meet the peculiar requirements in any particular district, it must, in my opinion, cost less and have a greater efficiency than any other process known, for not only does the electrical method precipitate the matters in suspension, but it also removes organic matter in solution and forms a precipitancy and disinfecting process in one operation The cause of any successful precipitation of suspended matter in sewage is entirely due to the formation of flocculent particles by means of chemical action. In the ordinary processes used this is obtained by the introduction of chemicals in a liquid form, and a large amount per gallon of sewage must be used to produce the necessary flocculency.

Electrolysis with oxidized plates produces this effect with a consumption of material ranging from one grain per gallon, and the stronger the sewage the less the power required to produce the effect. The action that takes place manufactures the necessary precipitancy agent in the sewage, whereas precipitation with solutions of chemicals means a consumption of several grains per gallon of the sewage, if the action is intended to cause an adequate deposition of matter in suspension, and the resulting effluent requires further treatment with some oxidizing agent to remove the organic matter in solution. With my electrolytical process at the same time that the precipitation of the suspended matter is taking place, the organic matter in solution is being oxidized by means of free nascent chlorine and oxygen given off at the positive plate.

The accompanying sketch will assist to a better understanding of the appliances used in the operation of this system :



Moved by Dr. Cassidy, seconded by Dr. Bryce : That inasmuch as it appears from the statements contained in the report on sewage and water supplies that there have been instituted up to the present year the sewage farm at London Asylum, the precipitation by porous carbon at Guelph Agricultural College, that the city of Toronto is about to expend money for testing the precipitation method of Major Conder ; be it therefore resolved, that the board demonstrate its confidence in the principles contained in the system of electrolysis of sewage as carried on in connection with London sewage at the Crossness works on the Thames by Mr. Webster, by urging that the Toronto Council consider the expediency of experimenting on this system, as well as that of Major Conder, and also that the Government be urged to introduce it as an experiment at the Belleville Institute, thus doing away with the complaint raised against that institution by the board of that city. Carried.

SOME FACTS ABOUT HEAT.

TO have a change of temperature it is of course necessary that heat should pass from one body to another. This can be done in three ways. These are called conduction, convection and radiation. When heat is transmitted by what is called conduction it passes from particle to particle of matter. Each particle, we may suppose, as it receives more of that kind of motion which we call heat, increases the motion of its neighbor. When heat passes through a body of any kind by conduction, each particle of matter on its way is heated. The rate at which heat passes in this way is different for different bodies. Through silver heat passes fastest by conduction. Hence we say that silver is the best of all conductors of heat. Copper has a conducting power 81 per cent. as great as that of silver. Zinc is another very good conductor, its conducting power being about 64 per cent. of that of silver.

Through air, gases and liquids, heat cannot pass by conduction, at least, it passes in so small a degree that it is quite inappreciable. In other words, heat does not pass from one particle of a liquid or gas to another. There are a great many proofs of this, one of which is that either or any similar substance may be burned upon the surface of water, and although a great heat is produced, it will not affect a thermometer placed a fraction of an inch below the surface. Heat is readily communicated from solids to liquids and liquids to solids. When a particle of a liquid is heated by coming in contact with some hot solid, as, for example, the bottom of a dish in which it is suspended over a fire, being expanded by the heat, the colder and heavier particles press it upward toward the surface and themselves come in contact with the hot bottom of the dish. In this way the whole body of liquid or gas contained in a vessel is heated. This method of transmitting heat is called "convection." When we consider this it becomes easy to understand why it is impossible to heat all of a liquid or gas contained in a vessel or a room where there is no circulation. To become heated the circulation is necessary ; every particle must in turn obtain its heat from a solid body, as the heat cannot pass from one particle to another. This accounts for a fact which has surprised many—that from some forms of steam boiler cold water can be drawn from the water legs while the boiler is making full steam freely, with the furnaces going full blast.

The third method by which heat may pass from one body to another is called "radiation." Heat radiated does not pass from one particle of a body to another, but goes through air or vacuum, or in some cases through solid bodies, with a very different velocity from that with which it is conducted. Radiant heat does not heat the body through which it passes. Thus the heat of the sun may be felt even when it passes through a pane of glass covered with frost. Many of our readers will call to mind Dr. Kane's experiment of a burning lens made from ice. In this case the heat rays from the sun were brought to a focus by passing through the ice lens, which was not melted. Most gases allow radiant heat to pass easily. When open fires were used for heating, it was radiant heat chiefly that warmed the rooms. This left the air comparatively cool ; in fact the air was not warmed at all, save as it came in contact with the walls of the room or objects in it. One of the peculiar advantages of the old fashioned fireplace was in the coolness of the air as compared with objects in the room.

It is the intention of Dr. Laberge, medical officer of health of the city of Montreal, to get the drainage system extended all through the city, as he thinks this is the only way to improve the health of the community. Out of 150 miles of streets there are only 90 miles of drains, and he considers it imperative to construct the remaining 60 miles as speedily as possible. He is strongly of opinion that by so doing the death-rate can be reduced.

PUBLICATIONS.

WE have received from a New York firm of publishers and Patent Solicitors the offer of some back numbers of their alleged architectural journal, "bound in handsome flexible covers in imitation Turkey leather," in return for a half column puff of their business. The publication is of the back number variety, and utterly valueless in the opinion of nearly everybody except the publishers who set such a high price upon it. Under the circumstances we cannot see our way to accept this exceedingly liberal (?) proposition.

Mr. James Wolfe, the founder and for many years the editor of the *California Architect*, recently formed a joint stock company of local architects to publish that journal in future, and was himself appointed general manager. The change appears not to have proved satisfactory to the parties concerned, and Mr. Wolfe has severed connection entirely with the concern. The architects will now assume (in turn we presume) the editorial chair. In the multitude of counsellers there should certainly be wisdom. It frequently happens, however, that work is better done by a single individual than if left in the hands of half a dozen.

We have been favored with a copy of the Kalendar of the Institute of British Architects for 1889-90. It contains, in addition to the Kalendar, with the dates of meetings, etc., marked thereon, a list of Members, Fellows, Associates, Honorary Associates, Honoary Fellows, Honorary Corresponding Members and Retired Fellows, besides a mass of other information of much value to architects in and out of the Institute. One of the most interesting features of the volume before us, is a copy of the late Prof. Donaldson's letter, convening the foundation meeting of the Institute, dated 8th May, 1834, the names of the architects who attended the meeting, and the first address of the Institute adopted at a meeting held at the Thatched House Tavern, London, the 2nd July, 1834.

When the idea was first put forward that it was possible to operate high candle power incandescent lamps, in series with arc lamps, it was looked upon with suspicion by the electrical fraternity, but within the last year there has been quite a change of opinion, as it has been clearly demonstrated that by using a properly constructed cut-out, the incandescent lamps can not only be successfully but economically operated on the arc circuits. Of course this system can never be as satisfactory as either the direct or alternating systems, but for small towns, where the number of incandescent lamps is not sufficient to warrant the purchase of a separate plant, it fills the bill to a nicety.

MANUFACTURES AND MATERIALS

A TENACIOUS SOLDER.

AN account is given in the *Beliner* of a soft alloy which adheres so firmly to metallic, glass, and porcelain surfaces that it can be used as a solder, and which, in fact, is valuable when the articles to be soldered are of such nature that they cannot bear a very high degree of temperature, the composition consisting of finely pulverized copper dust, which is obtained by shaking a solution of sulphate of copper with granulated zinc. The temperature of the solution rises considerably, and the metallic copper precipitated in the form of a brownish powder—20, 30 or 36 parts of this copper dust, according to the hardness desired, being placed in a cast-iron or porcelain-lined mortar, and well mixed with some sulphuric acid having a specific gravity of 1.85. To the paste thus formed are added 70 parts by weight of mercury, with constant stirring, and when thus thoroughly mixed, the amalgam is well rained in warm water, to remove the acid and then set aside to cool; in ten or twelve hours it is hard enough to scratch tin. On being used, it is heated to a temperature of 375 degrees Centigrade, and when kneaded in an iron mortar becomes as soft as wax; in this ductile state it can be spread upon any surface, to which, as it cools and hardens, it adheres with great tenacity.

A patent has been granted William J. Copp, Hamilton, for a hot air heating stove.

An inexhaustible quarry of roofing slate is said to have been discovered at Howe Sound, British Columbia.

Granite is being supplied the recently burned city of Seattle, W. T., from Keefer's quarries, Vancouver, B. C.

A fine white powder, called aclinolite, is imported from Canada by New York contractors for sprinkling on the surface of newly-laid asphalt pavement to improve the color.

C. B. Wright & Son, of Hull, have received a contract for supplying 20,000 barrels of Hull cement to be used in the repairs to be made on the Cornwall canal.

Brenton & Adams, of Cumberland Co., N. S., have brought suit for $20,000 damages against Wm. Dobson for alleged depreciation of the value of the quality of a building stone quarry of which they are the owners.

A composition of matter called Firimite plastering, consisting in a mixture of air slaked lime, plaster of Paris, river sand, cow hair mixed with serum, purified with carbolic acid, has been patented by Geo. M. Ford, of Montreal.

The sub-contractors in the erection of the new Departmental Buildings at Ottawa, signalized the completion of the work by presenting Mr. Mallette, of the firm of Charlebois & Co., chief contractors, with a silver water pitcher and goblets, as a mark of their esteem.

A window glass trust is said to have been formed in the United States. The various works in the West have past into the hands of the United Glass Company, of New York, capitalized at $3,000,000. It is proposed to place the fifty-five window glass factories of the country under one management with main office in New York.

An old English recipe for a preparatory size for the gilding of plaster, marble and wood, obviating also the effect of greasiness in the grain of wood, is as follows: Boil a handful of the leaves of worm wood and two or three heads of garlic in a quart of water until the liquor is reduced to one-half, previously adding for wood, and for wood only, half a handful of salt; then strain it through a cloth and add half a pint of water. When used it is to be mixed with a sufficient portion of good glue, boiling hot. The reason for leaving out salt in the application of the composition to plaster and marble is that any dampness would then occasion a saline effloresence on the gold.

The Toronto Electric Light Company is starting 100 new street arcs and building the plant for 300 more. The company, of which Mr. J. J. Wright is superintendent, have 560 city lights under contract, and run nearly 900 in all. They have put in a new 250 horse power engine and two 100 horse power boilers.

CONTRACTS

CONTRACTS AWARDED.

The contract for the new post office at Lachine has been awarded to Mr. Fitzpatrick, at the price of $10,270.

The contract for the Owen Sound harbor works has been awarded to Mr. R. T. Sutton, of Toronto, the lowest tenderer.

HALIFAX, N. S.—The contract for the new hall for St. Mary's Society, has been given to S. A. Marshall. The price is $16,000.

STRATHROY, ONT.—The offer of Mr. Thomas Wrong, of Chatham, to put in a combined electric light and gas service, has been accepted.

CONTRACTS OPEN.

WOODSTOCK, ONT.—A new music hall is to be erected here.

KINGSTON, ONT.—A factory for the manufacture of oil-cloth, is to be erected here.

WEST TORONTO JUNCTION.—Wm. Hess & Son, have bought a site on which to build a furniture factory.

BRACEBRIDGE, ONT.—Mr. W. H. Croker, Orillia, has prepared the plan for a residence for Sheriff Bettes.

SARNIA, ONT.—It is proposed to spend $6,300 in extending the water-works system, and $2,000 for a fire alarm system.

WINNIPEG, MAN.—$6,000 of the $8,000 required for the erection of the proposed new Christ Church, has been secured.

NEW WESTMINSTER.—The city authorities are obtaining professional advice, with the object of constructing a water works system.

LONDON, ONT.—Plans have been prepared, and tenders will shortly be asked for the erection of the new C. P. R. depot in this city.

VICTORIA, B. C.—Plans have been prepared from Mr. James' sketches for officers' residences, quartermaster's stores and residence, and guard house at this place.

ORILLIA, ONT.—The Incumbent and Church wardens of St. James Church, have been empowered to borrow money on mortgage for the erection of a new church.

QUEBEC.—It is as good as settled that an additional story will be added to the Court House in this city, and other improvements effected, the estimated cost of which is $200,000.

MONTREAL, QUE.—The ratepayers are to be asked to vote for the expenditure of $1,000,000 in improvements to the harbor, with the object of keeping back the annual spring floods.—The Sun Life Assurance Co., ask for competitive designs for a new office building which it is proposed to erect immediately.—Plans have been approved for an additional story and dome for the court house. The estimated cost is $26,000.

VICTORIA B. C.—A company has been organized for the purpose of building a $200,000 hotel.—It has been decided to erect a new Roman Catholic Cathedral, to seat 1,000 and to cost $60,000.

TORONTO, ONT.—Plans are being completed for the proposed new drill shed. Tenders will shortly be called for.—Ex-Ald. Pells will erect a new opera house at the corner of King and Frederick sts.—Commander Law has been instructed to prepare plans for a residence for the Roman Catholic Archbishop of Toronto, to cost from $35,000 to $40,000.—The congregation of Charles street Presbyterian Church will erect a new edifice on Bloor street, at an estimated cost of $42,000.—On the recommendation of the Engineer an asphalt pavement with 4 inch stone kerbs will be laid on Ontario street from Carlton to Howard St.—The following building permits have been granted from the office of the City Commissioner since the date of our last issue: Polson & Co., 3 story boiler house, and 2 story workshop, Esplanade, cost $2,200; W. H. C. Kerr, alterations and additions 60 Yonge St., cost $8,000; W. H. C. Kerr. 16 3 story bk. stores and offices, Gerrard and Yonge Sts., cost $40,000; J. G. Robinson, 2 story and attic bk. dwelling, Dunn Ave., cost $5,000; Geo. Ratcliffe, alterations 14 Morris St., cost $1,000; W. Small, 3 story bk. shop, 1372 Queen St. W., cost $3,000; Jno. McClennand, three 2 story bk. fronted houses, west side Seaton St., cost 21,600; Geo. Oliver, one story bk. store and alterations, 131 Yorkville Ave., cost $4,500; Mrs. Hunt, det. 2 story and attic bk. dwelling, Wilcox St., west of Huron St., cost $3,000; A. Allen, det. 2 story and attic bk. dwelling, Euclid Ave., north of College, cost $3,800; Mr. Beecroft, four 2 story bk. dwellings, rear Melbourne Ave., nr. Dufferin St., cost $6,000; Dr. A. Smith, 2 story bk. stable and dissecting room, Richmond St. west, cost $1,500; W. Goulding, 2 story and attic bk. dwelling, St. George St., north of Bloor, cost $15,000; R. Kidney & Co., alterations 17 and 19 Lowther Ave., cost $1,500; Thos Tushingham, 2 story and attic bk. residence, Beatty Ave., cost $7,000; Dr. Cesar, 2 story and attic bk. dwelling, Grosvenor St., cost $8,000; S. Martin, 2 story and attic bk. dwelling and r. c. stable, 45 St. Vincent St., cost $4,000; A. Henderson, 2 story bk. additions east side Victoria nr. Parliament St., cost $2,500; J. Haltby, 2 story and attic bk. dwelling, east side Markham St., north of College St., cost $2,500.

"I made a discovery, a few days ago," said J. J. Wade. "I find that we have been putting our tanks too far above the bowl of the closet. We have been placing them seven feet apart and it should be only six feet. I find that the water goes out with too much force, thus making too much noise, and sucking the valve down into position too quick, and making a sounding noise, which instead of disappearing with the long use of the tank, becomes worse. It makes more noise, does not act as well, and does not give any better flush. You take my tank here, and it is perfectly noiseless—not making any noise when the water goes on or when it goes out. Hereafter I will put them up only six feet, and no higher.—*Sanitary Plumber.*

Notre Dame Cathedral, Montreal, will be lighted by electricity.

We are informed that a model electric light station is under construction in Brockville.

The Barrie Electric Light Company, are putting in an additional incandescent system at a cost of $20,000.

The Picton Town Council will put in an $18,000 electric light plant, to be owned and op rated by the town.

The Intercolonial Railway now has its own complete system of incandescent lighting, with dynamos and other appliances of a well-equipped electric light station at Moncton and Levis for the storage of its own batteries.

The patent right to the apparatus for removing incrustations, sediments, or deposits of any kind from water pipes or mains, belonging to Mr. E. H. Keating, of Halifax, N. S., has been purchased by Mr. C. F. Fraser, the price paid for the Canadian patent being $20,000.

David H. Cameron, Stanhope, Que., has been granted a patent for a composition, for rendering wood indestructible by insects, moisture, or other causes. It consists of a compound of pitch tar, resin, coal tar, tallow and asphaltum mixed together in the following proportions, viz.: five pounds of pitch tar, five pounds of resin, one pound of coal tar, one pound of tallow, one-half pound of asphaltum, boiled together and tempered to the desired hardness by using tallow and resin, and to be applied to the wood with a brush or broom which is then sprinkled with sand, which is rubbed into the wood with a roller made for the purpose.

A joint convention of the American Institute of Architects and the Western Association of Architects will be held at Cincinnati on November 20th.

The importance of the curtains and hangings as a feature of the decoration of a house has become so generally recognized that they are now being included in the original plan instead of being left to the fancy or caprice of the occupant. We learn from the *Builder and Woodworker* that in the elegant apartment houses now being erected in Brooklyn upon the plans of architect Henry F. Cook, of New York, the parlors will be elaborately decorated on the walls and ceilings with chandeliers, open fireplaces and looped curtains at the windows.